

Environment topics at a glance

The protection of water quality in drilled wells

Improper well construction, and the failure to carry out routine preventive maintenance on drilled wells, may result in the contamination of a well supply and the creation of a hazard to both health and safety.

Section 20 of Regulation 903 under the Ontario Water Resources Act states that "The well owner shall maintain the well at all times after the completion date in a manner sufficient to prevent the entry into the well of surface water or other foreign materials."

The following information will help people who rely on drilled wells for their water supply preserve the water quality by maintaining or upgrading their drilled wells. Although upgrading work can be done by the owner, employing a competent well contractor is advised.

Well regulations

Ontario Regulation 903 provides for the licensing of water well contractors and well technicians by the Ministry of the Environment. This regulation prescribes the minimum construction standards that all well contractors, including private homeowners, must adhere to. The diagrams illustrate the minimum sealing requirements for drilled wells in different geological formations and well pits.

Factors contributing to the deterioration of well water quality

A poorly maintained or constructed well can result in the bacterial and/or chemical contamination of its water. The most common cause of contamination is foreign materials and surface waters in the immediate vicinity having direct access to the well.

In Ontario drilled wells are constructed using a variety of drilling machines that produce holes of 15 centimetres or more in

diameter. These are subsequently lined with steel casing or plastic. Problems due to surface contamination occur when the sealing on the outside or top of the casing is not watertight. This also applies to well pits.

Proper sealing is usually easier to achieve and maintain in drilled wells because of the small diameters and the liner materials involved. However, other damage such as subsidence or corrosion can occur, allowing surface waters to enter the well.

Indicators that sealing is inadequate and surface contamination is gaining access to the well include:

- presence of coliform bacteria in counts exceeding recommended limits set by health authorities
- changes in the quality of the water, such as turbidity, colour, taste and odour, especially after a rainstorm or snow melt
- rapid or large changes in the well water level, especially after a rainstorm or snow melt
- cascading or seeping water and/or staining along the casing in a well pit
- presence of biological material, such as animals or roots, in a well pit
- unsealed or parted joints or cracks in the casing wall or cover of a well pit
- settlement of soils around the well casing(s) and well pit, to or below land surface level
- absence of sanitary well seal or watertight cover set at an appropriate height above land surface level
- changes in the chemical quality of the well water detected through laboratory analysis.

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Preventive maintenance measures

The homeowner should be aware of the measures that can be taken for the care and maintenance of a well to help it provide good quality water.

1) Well location

To safeguard a well supply, do not do anything near the well that might result in contamination. Do not store, use or dispose of refuse, manure, petroleum, salt, pesticides or any other potential contaminant in the vicinity of the well. When mixing pesticides, the water supply line from the pressure system should be equipped with a backflow device.

2) Well construction

The sanitary well seal (well pit) or the well cap must be securely in place and watertight. If the well cap is damaged or cracked, replace it immediately so that contaminants will not have direct access to the well pit.

The sanitary well seal or well cap must be a minimum of 30 centimetres above land surface level. The well casing should not be cut off and buried.

The well vent pipes should be shielded and screened to prevent the entry of foreign matter. The vent pipe in a well pit must extend to within 15 centimetres or less of the well cap.

If any unsealed openings are found in the wall or along the joints of cement-tile casing in a well pit, make them watertight with an appropriate durable sealing material.

Applying this from the outside of the casing is preferable.

Any space outside the casing(s) should have been filled with a suitable sealant, such as Portland cement grout, concrete, bentonite, equivalent commercial slurry or clay slurry or well cuttings. This will prevent surface water runoff or shallow groundwater seeping directly into the well around the casing. Where settlement of the sealant has occurred, the circular space around the well casing should be excavated and backfilled with one of the sealants listed above.

If the general land surface around the well is depressed or susceptible to flooding, it

should be raised to at least 30 centimetres above ground level and regraded so that it slopes away from the well.

The connection at the well casing for pump and electrical lines must be watertight and properly sealed. If not, the casing may have to be excavated and the seal replaced. Use a commercially manufactured pitless adaptor for a good watertight seal through the side of the well casing, or a commercially manufactured sanitary well seal installed on top of the well casing.

Keep the well pit free of groundwater seepage and surface water, either through adequate drainage or the installation of an automatic pump. Well pits are not recommended where the high water table is less than 0.5 metres below the floor of the pit.

All wells that have been repaired should be chlorinated and tested for potability immediately after the work has been completed.

All abandoned wells must be sealed in accordance with Ontario Regulation 903.

Additional information sources

There are some additional publications you may wish to read. You can obtain a copy of the *Regulation 903* itself. The Ministry of the Environment also has fact sheets titled:

- *The protection of water quality in bored and dug wells*
- *Important facts about well construction*
- *Recommended methods of plugging abandoned water wells.*

For further information about wells contact your nearest Ministry of the Environment office as listed in the blue pages of your telephone directory.

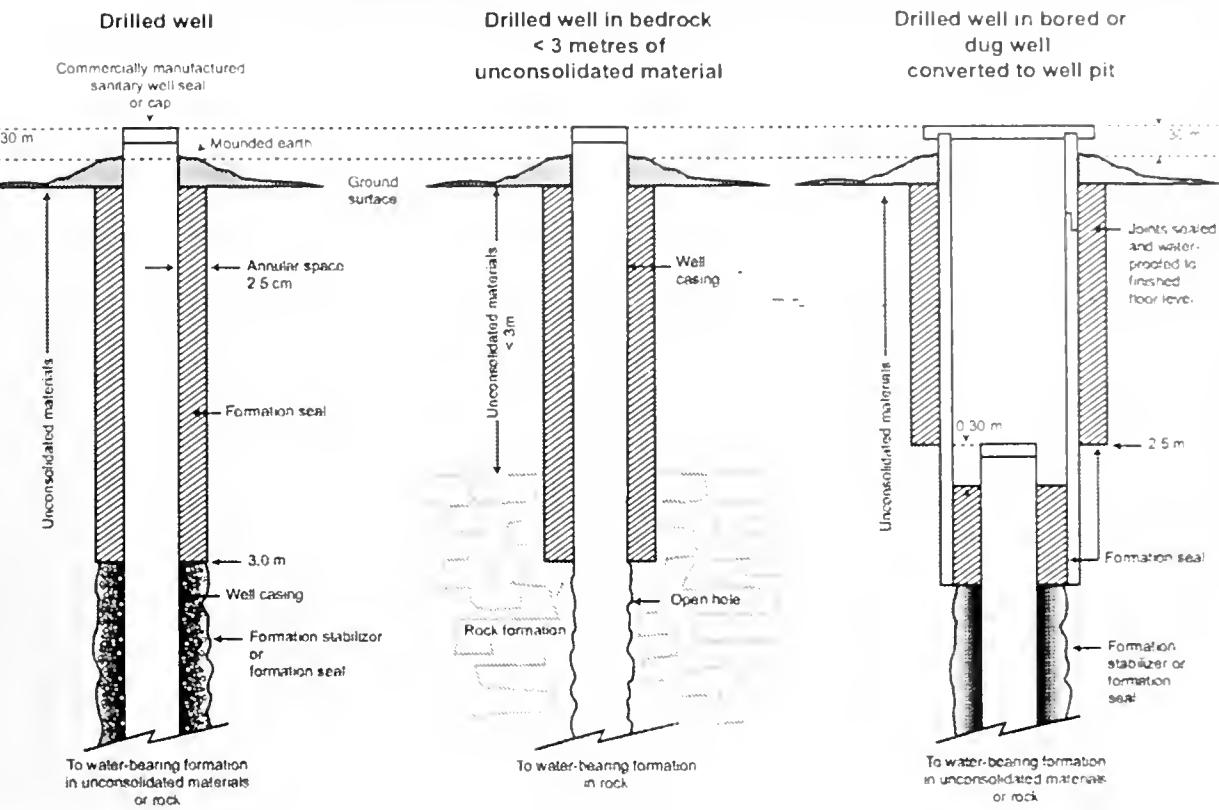
Or call the ministry's public information centre at 1-800-565-4923.

In Toronto call 416-325-4000.

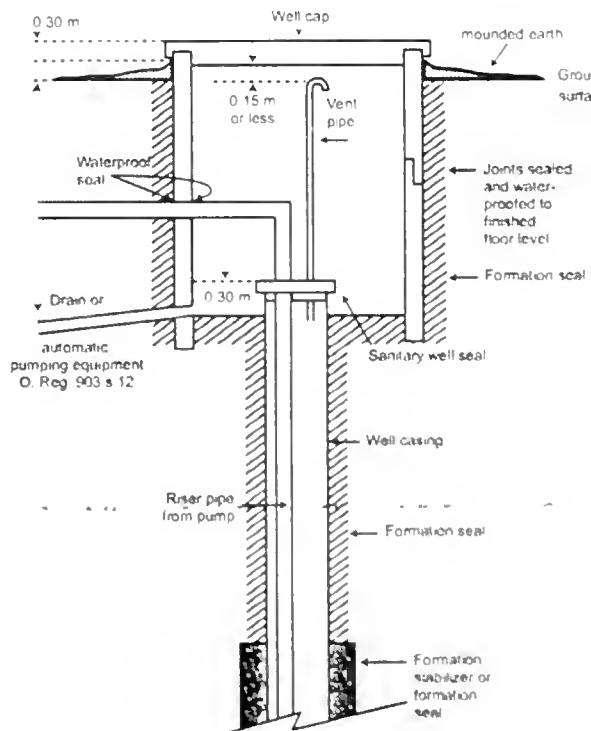
The ministry's Web site is at www.ene.gov.on.ca.

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Drilled wells and their sealing requirements



Well pit construction



Formation seal

Can be composed of portland cement grout, concrete, bentonite, equivalent commercial slurry or clay slurry. For details on selection and placement, see O. Reg 903 s.14.

Formation stabilizer

Can be composed of clean washed sand or gravel, clean overburden materials or cuttings.

NOTE
All dimensions are minimum construction standards.

